

PLASTIC SIGN FLUORESCENT TROUBLESHOOTING

PROBLEM: LAMP FLICKER, LAMP OUTAGE

THE ELECTRIC SIGN AS A SYSTEM OF COMPONENTS

SYSTEM COMPONENT	POSSIBLE CAUSE	TEST	POSSIBLE SOLUTION
Supply Voltage	Poor electrical ground.	Insure that the fixture/sign is well grounded.	Improve ground bonding connections/circuit.
	Low supply voltage.	Measure input voltage and insure that it is within recommended range. Verify supply wiring is of proper gauge. Guard against excessively long runs of supply wiring.	• Adjust supply transformer loading <i>or</i> • Install buck-boost transformer.
Supply Wiring & Connections	Poor connections.	Visual inspection for broken, loose wiring.	Secure & insulate connections.
Lamp Wiring & Connections	Poor lamp connection.	Inspect lamps & sockets for proper fit & positioning.	Mechanical adjustments as required.
	Loose, broken, dirty, corroded sockets or lamp contacts.		Replace/correct sockets & contacts.
	Improper lamp wiring.	Compare lamp hook-up to ballast label.	Correct as necessary.
Lamps	Improper lamp filament heating.	Visual inspection for end blackening of lamps.	Perform electrical test.
	Defective lamp/ improper lamp type.	Replace lamp.	Replace lamp.
	Excessive lamp footage.	Compare to ballast rating.	Correct as necessary.
Installation & Environment	Cold ambient temperature.	Check ballast rating, lamp type.	• Correct ballast/lamp if necessary <i>or</i> • Reduce any drafts.
	Water.	Visual inspection.	Improve the physical installation as required to eliminate water intrusion.
	Overheating.	Visual inspection.	Insure ballast has the opportunity for heat transfer to minimize heat build-up.

CAUTION: Servicing of electric signs should only be performed by qualified personnel. Disconnect power before servicing. Observe OSHA guidelines for safe electrical practices.

ELECTRICAL TEST PROCEDURE:

- I. Remove all lamps and turn sign/fixture on.
- II. Test cathode heating at each lamp socket with a filament tester.
 - A. If filament tester illuminates, cathode heating is good. Try known good lamps.
 - B. If filament tester doesn't illuminate, cathode heating is incorrect at that socket.
 1. Note each failed socket.
 2. Open wiring channel, disconnect ballast leads from fixture circuit, and apply filament tester to ballast leads for each failed socket.
 - a. If filament tester illuminates, ballast is OK, problem is in leads/socket. Double check lamp wiring with that shown on ballast label.
 - b. If filament tester illuminates poorly (or not at all), ballast is defective, a lead is shorted, or a poor connection is present.
- III. After correcting (a) and/or (b), close the wiring channel and repeat test II.
 - A. If no problem is indicated in the filament retest, relamp with known good lamps.
 - B. If known good lamps still do not operate, replace ballast.

TECHNICAL AND APPLICATION DATA

Heat

Ballasts generate heat during normal operation. By design, fluorescent ballasts should operate so that their maximum hot-spot case temperature does not exceed 90°C (194°F). Operating at higher temperatures will shorten ballast life. The temperature the ballast reaches depends on the temperature of the area surrounding it—plus the heat-conducting surface touching the ballast. Ballasts should be installed in a manner that avoids future overheating. To maintain normal ballast temperature, you should:

1. Mount the ballast against a flat surface of heavy gauge metal such as the structural part of the sign.
2. Keep the ballast as far away as possible from other ballasts, lamps or reflective surfaces. (Lamps generate approximately three-fourths of the heat in a plastic sign.) The ends of the lamps are the hottest part, so you should mount the ballast as far away from the ends as possible.
3. Paint the inside of the sign with flat white paint.

Moisture Protection

1. Vent the sign as well as possible without allowing water to enter.
2. Ballasts should be mounted horizontally (except for weatherproof types). If the ballast must be mounted vertically, allow room for sufficient air circulation. Certain codes and standards may require lead wire protection on the leads as they exit the sign ballast. For these applications, a tee-pee cover can be used to protect the wires from mechanical damage. These tee-pee covers are available through electrical suppliers.

Grounding

The white lead of a 120-volt ballast must be connected to the neutral or ground side of the power supply. All metal parts of the sign, as well as the ballast case, must be grounded either through the conduit which holds the power supply or by direct connection with a grounding wire. An ungrounded sign is a

potential hazard—and it can give misleading symptoms when looking for sign faults.

Proper Lamp Life and Starting

In rapid-start installations, proper filament heating is necessary for reliable starting and normal lamp life. To ensure that proper heating is taking place, the following steps are recommended:

1. Lamp leads should be kept as short as possible and with a minimum of splices.
2. All connections should be soldered.
3. Maintain proper alignment and spacing of lamp holders to ensure good contact in the sockets.
4. Mount lamps within one inch of grounded metal. This is one lamp manufacturer's published requirement for reliable starting.

Flashing

Rapid-start lamps may be flashed without reduction in lamp life by using ballasts which are specifically designed for this operation. These ballasts are designed with slightly higher filament voltages than the conventional ballast to ensure satisfactory lamp life. Instant-start lamps cannot be flashed. CAUTION: Use only one flasher contact per ballast.

Light Output vs. Temperature

The light output of a fluorescent lamp varies according to the mercury vapor pressure inside the lamp. This pressure is controlled by the coldest spot on the bulb wall. The ballast may start the lamp, but the light output can be very low if the bulb wall temperature is low. Several factors influence this, including ambient temperatures, wind, type of enclosure, etc. If maximum light output is critical, consult a lamp manufacturer for advice.

Lamp Starting Problems

Occasionally a field problem will arise involving improper lamp starting. The usual complaint is that the lamps start slowly (or not at all). Here are some of the causes:

1. Low line voltage
2. Improper sign grounding
3. Insufficient or no filament voltage
4. Insufficient or no open circuit voltage
5. Dirty lamps during high-humidity operating conditions
6. Lamps improperly inserted in the sockets

If lamp starting is a problem in your installation, check the sign grounding, filament voltage (3.4 - 3.9 volts), and open circuit voltage. If all are normal, the probable cause is dirty lamps. The lamps should be washed in clean water, drip-dried, and reinstalled. If this doesn't solve the problem, contact your nearest Universal Lighting Technologies representative for further assistance.

Short Lamp Life

If the lamp has not given proper length of service as specified by the lamp manufacturer, the following reasons for early failure should be considered:

1. Improper starting due to insufficient filament voltage
2. Frequent starting and short operating periods
3. Improper ballast
4. Improper voltage supply
5. Faulty wiring
6. Defective lamps
7. Lamps improperly inserted in sockets

Early lamp failure will be preceded by a dense blackening on either or both ends of the lamps. This blackening will extend three or four inches from the lamp base and should not be confused with a small dense spot, which is a mercury deposit that can occur any time during lamp life. Dense blackening due to early lamp failure should not be confused with the gray bands that sometimes appear toward the *end* of normal lamp life (about two inches from either end of the lamp).